

**Listing of Claims:**

1. (currently amended) A pleated filter cartridge for removing particulates from liquid, the pleated filter cartridge being of the type including a perforate core, a pair of endcaps, and an annular ~~non-woven~~ filter element around the core formed by substantially axially-parallel pleats of ~~at least one sheet of~~ non-woven filter material, the filter element having opposite ends each in sealing engagement with one of the endcaps, characterized in that the filter element consists of a single layer of the filter material and a mesh layer, the single-layer filter material is being a non-perforated non-woven material of flash-spun plexifilamentary high-density polyethylene fibrils, the filter material having a thickness of less than about 0.15 mm, a pressure drop of less than 4 psid at a flow rate of 10 gal/hr, and a filtration efficiency of at least 98% of 1-2 micron particulates at a pressure differential of 30 psid.

2. (original) The pleated filter cartridge of claim 1 wherein the filter material has a pressure drop of less than about 1.5 psid at a flow rate of 10 gal/hr and the filtration efficiency is at least about 99% of 1-2 micron particulates at a pressure differential of 30 psid.

3. (original) The pleated filter cartridge of claim 2 wherein the mean flow pore size of the filter material is greater than 4 microns while its nominal pore-size filtration rating is 1 micron.

4. (original) The pleated filter cartridge of claim 2 wherein the filter material has a Gurley Hill porosity rating no greater than about 5 sec/100cc.

5. (canceled)

6. (previously presented) The pleated filter cartridge of claim 1 wherein the filter material has a thickness less than or equal to about 0.13 mm.

7. (original) The pleated filter cartridge of claim 1 wherein the filter material has a basis weight of less than about 45 g/m<sup>2</sup>.

8. (canceled)

9. (previously presented) The pleated filter cartridge of claim 7 wherein the filter material has a thickness less than or equal to about 0.13 mm.

10. (canceled)

11. (currently amended) The pleated filter cartridge of ~~claim 10~~ claim 1 wherein the mesh layer is between the filter material and the core.

12. (canceled)

13. (currently amended) The pleated filter cartridge of ~~claim 10~~ claim 1 wherein the mesh layer is a low-density polyethylene.

14. (previously presented) The pleated filter cartridge of claim 13 wherein:

- the high-density polyethylene filter material has a softening temperature range;
- the polyethylene mesh has a softening temperature range lower than the lower end of the softening temperature range of the high-density polyethylene filter material; and
- the polyethylene mesh is tack-point interconnected to the filter material without having compromised the filter material.

15. (original) The pleated filter cartridge of claim 14 wherein the mesh layer and filter material were tack-point interconnected prior to pleating.

16. (canceled)

17. (previously presented) The pleated filter cartridge of claim 14 wherein the softening temperature range of the polyethylene mesh is within the range of 170-195° F.

18-19. (canceled)

20. (original) The pleated filter cartridge of claim 1 further including a containment sleeve of polyethylene netting enclosing the annular filter element.

21. (original) The pleated filter cartridge of claim 20 wherein the core and the endcaps are of polyethylene.

22-31. (canceled)

**Remarks/Arguments**

Despite the clear showing and strong evidence of patentability, the April 19, 2004 Advisory Action, which preceded the current RCE, for the first time:

- misread the Marshall et al. document in an attempt to change a material (TYVEK Soloflo) that Dr. Mayer shows is very flimsy into something which it is not -- a multi-sheet, not-as-flimsy material -- in order to reject the plain evidence of patentability of applicant's pleated non-woven annular filter cartridge invention (see the portion of ¶4 of the April 19, 2004 Advisory Action that begins two lines from the bottom of p. 4);
- challenged the direct and specific assertion by Dr. Mayer concerning the extreme flimsiness of the TYVEK filter material that is used in applicant's inventive pleated non-woven annular filter cartridge (see ¶1(d) of the Advisory Action); and
- attempted to somehow turn Dr. Mayer's strong showing of non-obviousness into a brand new and unsupported (and, indeed, false) allegation of possible inoperability (see the first portions of ¶4 of the April 19, 2004 Advisory Action).

The April 19, 2004 Advisory Action, however, also made points which suggested to applicant that incorporating certain preferred features (from dependent claims) into sole independent claim 1 could help in supporting the patentability of applicant's claims. Thus, such claim adjustments are now made.

The following is a brief summary and elaboration of the points discussed in the telephone interview of July 20, 2004, some of which were referred to during the August 24, 2004 interview, along with new points arising due to mention of the Jackson reference.

### **The Claim Amendments**

As indicated would be done, claim 1 is now adjusted to include particular limitations which the previous Examiner, in the April 19, 2004 Advisory Action, accurately pointed out were not previously included in claim 1 -- despite certain arguments that had been advanced by applicant in favor of patentability.

More specifically, at least in ¶1(c) and ¶1(d) of the April 19, 2004 Advisory Action, the previous Examiner pointed out that claim 1 did not in fact require a *sole* layer (*i.e.*, *only* one layer) of the particular very flimsy non-woven filter material (TYVEK Soloflo) characteristic of applicant's claimed improved pleated non-woven annular filter cartridge. That is now changed in claim 1 by bringing the limitation of claim 12 (now canceled) into claim 1 and stating that the filter element "consists of a single layer of the filter material ...," *i.e.*, the specific "single-layer" filter material thereafter described in the remainder of claim 1.

Likewise, in ¶1(b) of the April 19, 2004 Advisory Action the previous Examiner implicitly suggested inclusion of the "mesh layer" in claim 1, and that has now been done by reciting it as the only other part of the "filter element." (The mesh layer was previously in dependent claim 10.) It should be emphasized that applicant has *never* contended that the mesh layer itself is patentable; indeed, near the end of the first paragraph on page 2 of the specification, applicant notes that use of a mesh layer as support in pleated annular non-woven filter cartridges has been known. As pointed out in more detail below, and by Dr. Mayer's additional declaration, inclusion of the mesh layer in no way detracts from the non-obviousness of applicant's invention; *i.e.*, the nature of an included mesh layer does not change the non-obviousness of the invention.

The Examiner should note that the rewording of claim 1 was facilitated by shifting the adjective “non-woven” in the early portion of claim 1 from being a modifier of “filter element” to more properly being a modifier of “filter material” -- *i.e.*, what amended claim 1 now requires to be a single layer. This change is helpful for clarity, but otherwise not significant.

Applicant urges the Examiner to recognize the patentability of the amended claims, which define a surprising invention -- a greatly improved pleated non-woven annular filter cartridge.

**It Cannot Be Argued That the Specific  
Non-Woven Filter Material Is Not TYVEK Soloflo.**

In ¶1(a) of the April 19, 2004 Advisory Action, the prior Examiner argues that “applicant’s base claim has not been narrowed down to any specific material of construction, in particular to TYVEK Soloflo filter material.” This is simply wrong.

The nature of the description of the *particular* polyethylene non-woven in the pending claims is such that the claims *are in fact limited* to TYVEK Soloflo, the material about which Dr. Ernest Mayer has provided critical information in his declaration. See, among other things, the last sentence of ¶5 of the March 11, 2004 Mayer Declaration, in which Dr. Mayer directly states that TYVEK Soloflo is “the TYVEK used in the unique annular pleated filter cartridges of the Rose patent application.” Dr. Mayer is intimately familiar with the characteristics of the subject material and the Examiner is simply wrong to challenge applicant’s statement (at least at p. 5, lines 6-8 of the specification and many times during patent prosecution) and the expert assertions of Dr. Mayer on this point.

**The Prior Examiner Mischaracterized Marshall et al.  
to Debunk the Showing of Patentability of Applicant's  
Pleated Annular Non-Woven Filter Cartridge Invention.**

The prior Examiner is simply *wrong* in asserting, in ¶4 of the April 19, 2004 Advisory Action, (1) that the filter material disclosed in Examples 26 and 27 of Marshall et al. "is formed by a number of sheets laminated/bonded by calendaring to each other" and (2) that the "resulting (laminated/ bonded) filter material" (which she correctly notes is within the thickness range of applicant's claims) "therefore, would not be as flimsy or extremely flexible as Dr. Mayer suggested." What such April 19, 2004 Advisory Action assertion involves is a wrongful effort to interpret Marshall et al. in a way that seeks to debunk the specific and direct evidence of filter-material flimsiness provided by DuPont's Dr. Mayer -- which shows that such thin material is very flimsy, so much so that it would not be thought, by the person of ordinary skill in the art, to be usable for pleated annular non-woven filter cartridges, given particular requirements for that class of products.

In strong response to such April 19, 2004 Advisory Action assertion, it must be pointed out that the filter materials of Examples 26 and 27 of Marshall et al., rather than being formed by "a number of sheets," can be shown (from the Marshall et al. document itself) to be *single* sheets -- in fact, the sheets which, as Dr. Mayer showed in ¶8 of his March 11, 2004 declaration, are "so very flimsy and different in nature from the non-woven material of the Gsell et al. patent that the person of ordinary skill in the art of annular pleated filter cartridges would not have considered [them] for this class of products." Examples 26 and 27 of Marshall et al., to which the prior Examiner referred in her April 19, 2004 Advisory Action, are described in detail on pp. 24-26 of



Marshall et al. It is very apparent from a reading of Marshall et al. that the references to “whole-surface bonding” and a “calendar bonder” on p. 25 have nothing whatsoever to do with multiple sheets or laminates. Instead, such terms relate to the process of spin-bonding, and relate to how the surfaces of the *single* sheets are treated during the process of their manufacture.

This clear conclusion is further seen by reference to DuPont’s United States Patent Nos. 3,532,589 and 4,652,322 which are referred to on p. 25 of Marshall et al. For example, the ‘589 patent makes this clear in the Abstract (“a non-woven sheet”) and in column 1, lines 35-42, and elsewhere, and the ‘322 patent makes it clear in column 1, lines 7-9 (“a continuous process for bonding and stretching a fibrous polyolefin nonwoven sheet”) and elsewhere. There is *no basis whatsoever* for concluding, as the prior Examiner did in the April 19, 2004 Advisory Action, that Examples 26 and 27 of Marshall et al. involve multi-sheet materials (laminates).

The prior Examiner’s characterization in the April 19, 2004 Advisory Action is mistaken. Dr. Mayer’s direct and informed statements concerning the very flimsy characteristic of the subject material are accurate, and strongly support patentability of applicant’s claimed pleated annular non-woven filter cartridge invention.

**The Suggestion of Possible Inoperability  
Is Both Wrong and an Impermissible Handling  
of Dr. Mayer’s Strong Evidence of Patentability.**

The prior Examiner, in ¶4 of the April 19, 2004 Advisory Action, for the first time made a most unusual and unsupported challenge to the very “operability of applicant’s claimed invention” -- and bases it solely on the strong factual evidence of non-obviousness from Dr.

Ernest Mayer himself. This is impermissible -- and is tantamount to stating that because the invention is surprising and unexpected, it must not be an invention -- it must not work.

The prior Examiner's statement and her manner of thinking are both wrong, and they wrongfully seek to discredit and discount the inventive work of applicant. Applicant's plain assertion of operability (indeed, of significant and advantageous results) and Dr. Mayer's detailed recognition of the invention and of its non-obviousness cannot be turned aside in this manner.

Applicant's invention is operable. And, it should be pointed out that, although in a rather unusual way, the prior Examiner has clearly recognized the patentability of applicant's improved pleated annular non-woven filter cartridge invention.

**Applicant's Invention Is a Patentable Advance Over  
the Prior Art and the Application Should Be Allowed.**

In the last rejection, claims 1-4, 6, 7, 9-13, 22, 23, and 29-31 were rejected under 35 USC §103(a) as unpatentable over Gsell et al. in view of Marshall et al. As noted above, claims 1-4, 6-7, 9, 11, 13-15, 17 and 20-21 now remain pending, all other claims now having been canceled. Claim 1, the sole independent claim, as now adjusted, is patentably distinguishable over Gsell et al. in view of Marshall et al., and should be allowed, along with its dependent claims.

It has been shown that the Gsell et al. patent teaches a typical pleated annular non-woven filter cartridge -- having a non-woven filter material that is *much thicker* (indeed, 17 times thicker) than the filter material required by applicant's claims. Gsell et al. (like the earlier cited Stoyell et al. patent) involves a *non-woven* material which, as in other non-woven-using annular pleated filter cartridges of the prior art, is more than an order of magnitude thicker than the

material in applicant's claimed invention. The Examiner, at ¶28 (pages 17-18) of the action of December 11, 2003, agreed that "Gsell et al. have disclosed or taught a filter material which is thicker (i.e., 17 times thicker) than what is claimed [by applicant] ... ."

Even the very thinnest non-woven material contemplated in Gsell et al. is *nearly 17 times thicker* than the very thickest material of applicant's claimed pleated annular non-woven filter cartridge invention, which requires a specific type of non-woven material, which has "a thickness of less than about 0.15 mm." The Gsell et al. non-woven is *not* a TYVEK, and not TYVEK Soloflo; nor for that matter is it even polyethylene. Instead, it is polyethylene terephthalate (PET) or polybutylene terephthalate (PBT).

Thick non-woven materials are seen in annular pleated filter cartridges, but the claimed TYVEK material is so very flimsy and different in nature that the person of ordinary skill in the art related would not have considered it a candidate for filter medium in this special class of products -- pleated annular filter cartridges. As already noted, this is strongly supported by detailed facts provided in the Mayer declarations, which are specifically on point in their support of the patentability of the claimed invention. Applicant incorporates by reference pertinent points and arguments made in the previous response.

**The Jackson Patent, Referring to Mesh, Relates to Admitted Prior Art; the Presence of a Mesh Does Not Detract from the Showing of Non-Obviousness.**

The undersigned thanks the Examiner for signaling the possible citation of Patent No. 3,042,571 (Jackson) with respect to mesh layers. Applicant points out that the use of mesh layers with annular pleated non-woven filter cartridges of the prior art was always acknowledged in

applicant's specification, which states, at page 2, lines 9-11, that, "In some cases, one or more open mesh or net layers are used in pleated structures for spacing, support or flow-facilitating purposes." Referring to aspects of certain embodiments of applicant's invention, the nature of attachment of the mesh layer to the non-woven is described (at page 5, lines 23-28) as involving *random tack-point* interconnection:

"[T]he mesh is tack-point interconnected to the filter material ... . Such tack-point interconnections are polyethylene-to-polyethylene bonding at randomly-spaced points of contact of the mesh with the filter material."

The loose random nature of the attachment is significant because it means that presence of the mesh layer would *not* change the thinking of persons of ordinary skill in the field of pleated annular non-woven filter cartridges with respect to obviousness of the invention. Dr. Mayer's further supplemental declaration, now attached, makes this point clearly and in detail, and it is clear that his prior declaration was made with knowledge about the claimed invention.

Dr. Mayer has already given specific facts showing the extreme flimsiness of the TYVEK Soloflo material used in the claimed invention and the implications of this flimsiness in the thinking of those of ordinary skill in the art of annular pleated non-woven filter cartridges, given the sealing problems of such products. His further declaration shows that the presence of the mesh in no way detracts from his fact-based conclusions. His conclusions are reiterated in detail.

**The Amended Claims Represent an Important  
Advance in Pleated Annular Non-Woven Filter  
Cartridges; the Application Should Now Be Allowed.**

Applicant's specification is thorough and complete, and presents an invention that is a significant advance in the crowded art of pleated annular non-woven filter cartridges. Further-

more, prosecution of the instant patent application has been particularly thorough with a great number of pieces of prior art having been cited and overcome. The prior annular pleated filter cartridge patents that have been cited and overcome include the following:

- Patent No. 5,154,827 (Ashelin et al.). This reference was overcome by the amendment and response of November 28, 2001, which was accompanied by the first Meyer declaration.
- Patent No. 6,143,106 (Shane). This reference was overcome by the response of June 21, 2002, which included a declaration of Rose swearing behind the Shane reference. The response also included arguments of shortcomings in the Shane disclosure with respect to applicant's claims.
- Patent No. 5,543,047 (Stoyell et al.). This reference was overcome by the amendment and response of February 7, 2003.
- Patent No. 4,588,464 (Miyagi et al.). This reference was overcome by the amendment and response of February 7, 2003.

These prior overcome rejections preceded the current rejection based on the Gsell et al. patent, combined, of course, with Marshall et al. (disclosing the acknowledged TYVEK Soloflo material). Gsell et al. has been thoroughly distinguished (and is again distinguished above) based, *inter alia*, on the fact that even the very thinnest non-woven material contemplated in Gsell et al. is *nearly 17 times thicker* than the very thickest material of applicant's claimed pleated annular non-woven filter cartridge. The Gsell et al. non-woven is *not* TYVEK Soloflo. While non-woven pleated annular filter cartridges exist, it has been consistently pointed out that

the non-wovens in such cartridges are very thick and bulky compared to the extremely thin and flimsy TYVEK Soloflo material in the present invention.

Beginning in the original application itself, applicant has fully acknowledged the prior art, including the existence of the TYVEK Soloflo material used in the unique annular pleated non-woven filter cartridge of this invention. Applicant has also obtained, by way of submission of three detailed declarations, the expertise of Dr. Ernest Mayer of DuPont, manufacturers of the TYVEK Soloflo sheets -- to provide detailed evidence of non-obviousness of the claimed invention. This evidence cannot be casually dismissed; it represents information from a highly-reliable source in touch with practical problems in the art related to annular pleated non-woven filter cartridges. The significance and unexpectedness of applicant's invention is spoken of in detail.

Applicant notes that there is a specific precedent for the grant of a United States patent involving a particular and unexpected use of TYVEK Soloflo for a *particular filter form* for which such flimsy TYVEK sheet filter material would appear to be problematic. In particular, the earlier grant of United States Patent No. 6,355,171 (Rose and Hughes.), "Filter Sock for Liquid Filtration Apparatus," which is owned by Oberlin Filter Company, assignee of the pending application, shows recognition of the sort of contrarian-thinking inventiveness that is involved in the present invention. Applicant urges the Patent & Trademark Office to recognize all the evidence of non-obviousness on record in the present application.

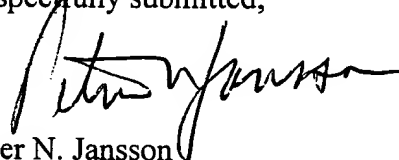
In view of all the detailed points made above, the rejection should now be lifted and the application allowed. Applicant's claims as now presented clearly meet all of the patent-ability

In re Patent Application Serial No. 09/599,269  
Amendment dated August 25, 2004  
Following the Advisory Action of August 19, 2004

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tests. Reconsideration is respectfully requested. The Examiner is respectfully invited to call the undersigned attorney if that would be helpful in facilitating resolution of any issue which might remain.

Respectfully submitted,



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**CERTIFICATE OF FACSIMILE TRANSMISSION**

I hereby certify that the above Amendment of Serial No. 09/599,269, is being facsimile transmitted to Examiner Terry K. Cecil, Group Art Unit 1723 at the U.S. Patent and Trademark Office, fax # 703/872-9306, on August 25, 2004, along with other papers relating to a second RCE.

